Box 1.1: A Sectoral Examination of Singapore's Productivity Growth

Productivity is the key to achieving sustainable growth, as it allows us to stay globally competitive and achieve higher living standards.

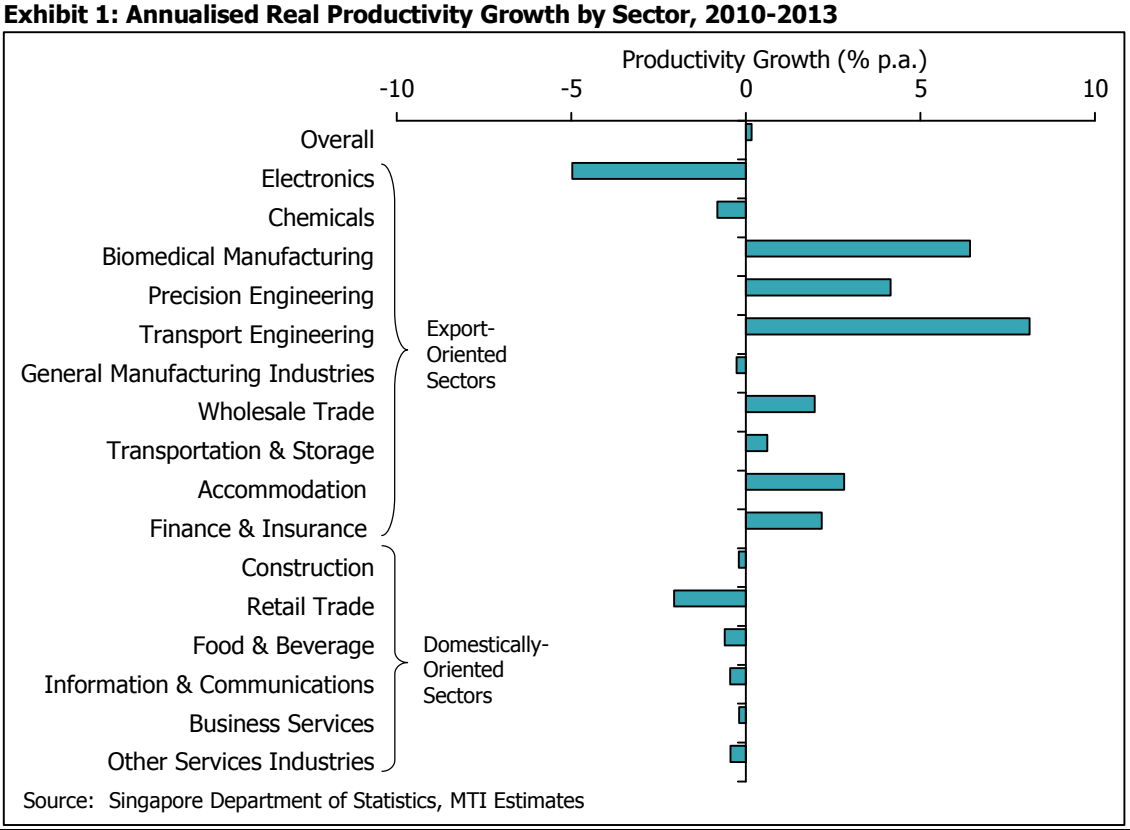
In 2010, the Singapore Government made a decisive shift towards productivity-driven growth. The National Productivity & Continuing Education Council (NPCEC) was set up to drive efforts to raise productivity. Four years into the productivity drive, Singapore's productivity performance remains weak. While productivity grew by 2.9 per cent on an annualised basis from 2009 to 2013, this largely stemmed from the 2010 economic recovery, with productivity surging by 12 per cent that year. Productivity has been stagnant since, growing only 0.2 per cent per annum from 2010 to 2013. Some analysts have pointed to this weak performance as an indication that our restructuring drive has failed.

However, aggregate productivity figures do not provide an accurate and comprehensive picture of the economic restructuring landscape. It conceals considerable variations across sectors. Short-term productivity growth over a few years may also reflect cyclical factors related to demand, rather than underlying structural changes which are often observed only over a longer time horizon.

While export-oriented sectors posted healthy productivity growth, overall productivity was dragged down by productivity declines in the domestically-oriented sectors...

Looking at productivity growth by sector, we observe stark differences between export-oriented and domestically-oriented sectors (Exhibit 1).[1] In particular, the Biomedical Manufacturing, Transport Engineering and Precision Engineering clusters registered strong productivity growth of 6.4 per cent to 8.1 per cent per annum from 2010 to 2013. Wholesale Trade and Finance & Insurance also saw steady productivity gains of 2.0 per cent and 2.2 per cent per annum over the same period. By contrast, domestically-oriented sectors like Construction, Retail Trade and Food Services saw productivity declines of 0.2 per cent to 2.1 per cent per annum over the same period.

Exhibit 1: Annualised Real Productivity Growth by Sector, 2010-2013



Source: Singapore Department of Statistics, MTI Estimates

[1] The classification of a sector as export or domestically-oriented is broadly determined based on the exports share of its total output as reflected in the 2010 Input-Output tables.

To have a sense of the drag that domestically-oriented sectors collectively posed on overall productivity growth over this period, we first group the sectors in the economy based on whether they are export-oriented or domestically-oriented. Together, the export-oriented sectors, which include the Manufacturing clusters, Wholesale Trade, Transportation & Storage, Accommodation and Finance & Insurance, accounted for slightly more than half of the economy. Productivity in these sectors grew by 2.1 per cent per annum in the last three years, substantially higher than the 0.2 per cent growth registered for the overall economy (Exhibit 2).

On the other hand, domestically-oriented sectors performed significantly worse. Productivity in the Construction, Retail Trade, Food Services, Information & Communications, Business Services and Other Services sectors – which collectively accounted for more than one-third of the economy – declined by 0.3 per cent per annum over the same period.

In general, the export-oriented sectors may have performed better because they are globally competitive sectors that are able to transform and adjust processes quickly to changing market conditions. Many domestically-oriented sectors, on the other hand, are struggling with the tightening manpower supply, with some companies facing problems moving up the value-chain or improving their processes. Sector-specific factors may also explain the slow productivity growth in some of these sectors. For example, productivity gains from process improvements may take a longer time to materialise in the Construction sector due to the long lag time from project design to project completion stage. In particular, more productive construction technologies such as Prefabricated Pre-finished Volumetric Construction, Cross-Laminated Timber and legislation mandating more buildable designs are only applicable to new projects, and tend not to affect existing projects.

Exhibit 2: Productivity Growth of Export- and Domestically-oriented Sectors

	Share of Economy[2]	Annualised Productivity Growth Rate, 2010 - 2013
Overall economy	100%	0.2%
Export-oriented sectors ▪ Manufacturing ▪ Wholesale Trade ▪ Transportation & Storage ▪ Accommodations ▪ Finance & Insurance	55.4%	2.1%
Domestically-oriented sectors ▪ Construction ▪ Retail Trade ▪ Food Services ▪ Information & Communications ▪ Business Services ▪ Other Services	38.6%	-0.3%

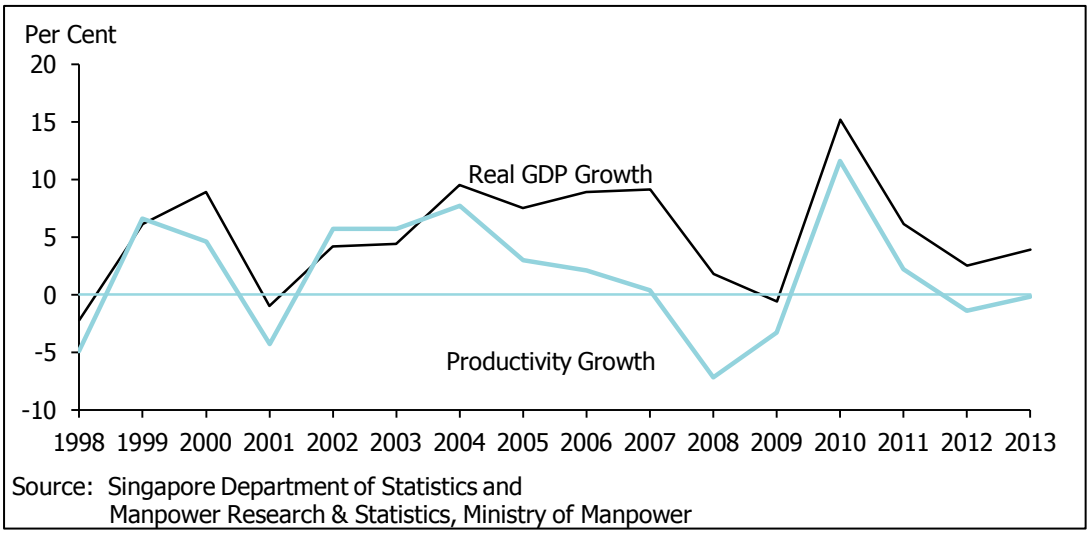
Overall, we estimate that the poor productivity performance of the domestically-oriented sectors had dragged down productivity growth of the economy by 1.1 percentage-points each year from 2010 to 2013. Excluding these sectors, productivity for the overall economy would have grown by 1.3 per cent per annum, instead of 0.2 per cent per annum.

[2] Based on 2013 nominal shares of GDP. The shares of export-oriented and domestically-oriented sectors do not sum to 100 per cent as we have not accounted for the VA for other goods producing industries and ownership of dwellings.

Productivity growth trends, adjusting for cyclical effects, also differ between export- and domestically-oriented sectors

Beyond sectoral differences, the weakness in aggregate productivity may also have been due to cyclical factors related to demand conditions, rather than more persistent structural causes. As shown in Exhibit 3, productivity growth in the short-term is highly pro-cyclical, with the correlation between GDP and productivity growth exceeding 80 per cent.

Exhibit 3: Productivity movements are highly pro-cyclical



Source: Singapore Department of Statistics and
Manpower Research & Statistics, Ministry of Manpower

The pro-cyclical nature of productivity occurs because firms do not hire and shed workers immediately in response to business conditions. Instead, firms change factor utilisation rates in response to short-term changes in demand. When the economic climate is weak, firms are likely to hold on to workers and maintain some spare capacity, or reduce working hours. This is because firms may have minimum staffing requirements, or they may believe that the weakness is only temporary and maintaining some capacity will enable them to take advantage of the eventual recovery. Firms may also divert resources towards business development activities which may not count as output in the short term.

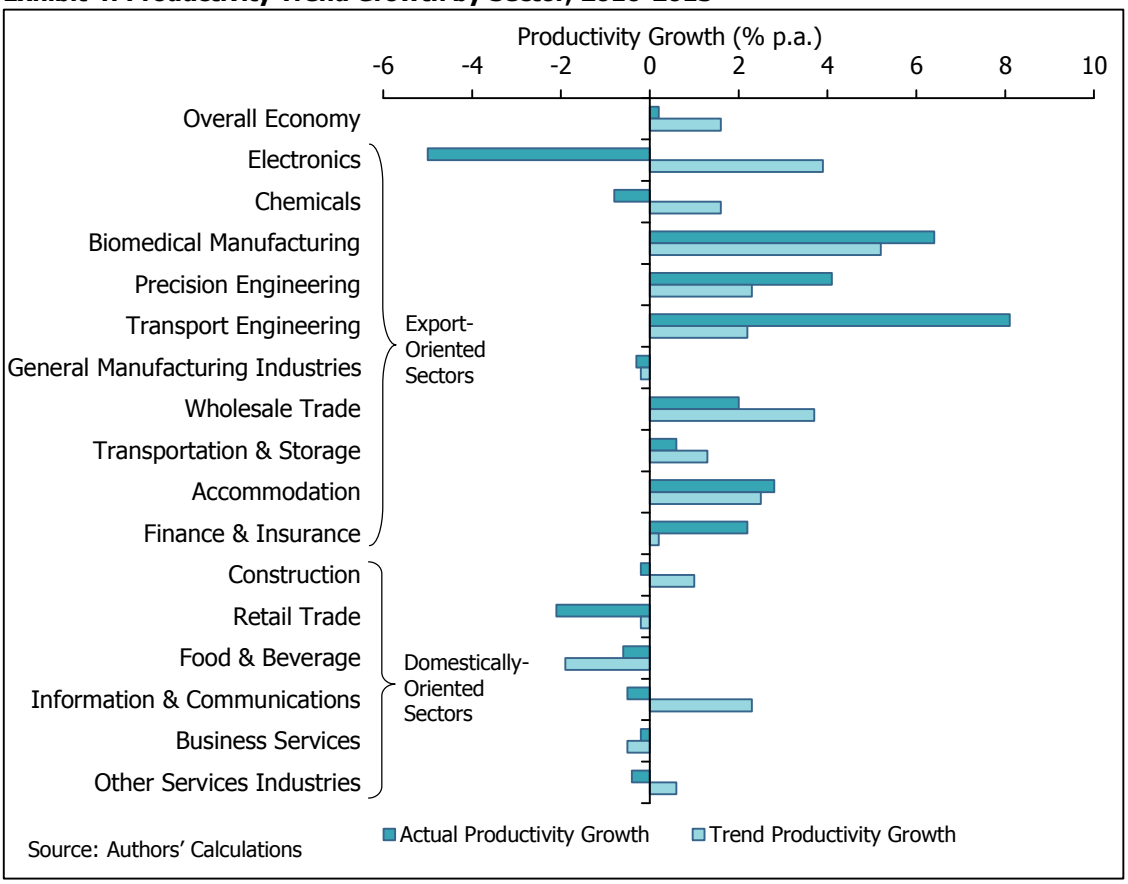
To strip out the cyclical component of productivity growth, we utilise a Hodrick-Prescott Filter, a commonly used mathematical tool in macroeconomics to remove short-term business cycle fluctuations from a data series.[3] The resulting "trend productivity growth" thus measures productivity changes that reflect long-term structural, rather than cyclical, factors. In particular, we examine how trend productivity growth in the last three years differs from actual productivity growth at the overall economy and sectoral levels. The results are summarised in Exhibit 4.

Three broad observations can be made. First, trend productivity growth for the overall economy from 2010 to 2013 was 1.6 per cent per annum. This was higher than the actual productivity growth of 0.2 per cent per annum, suggesting that the lacklustre productivity growth in the last three years may be in part due to cyclical factors. Second, as before, trend productivity growth for externally-oriented sectors tends to be stronger than that for domestically-oriented sectors. In fact, a few domestically-oriented sectors (e.g., Retail and Food Services) continued to see negative trend productivity growth.

Third, in some export-oriented and domestically-oriented sectors, trend productivity growth was higher than actual productivity growth. In particular, while actual productivity in the Electronics cluster declined in the last three years, its trend growth was 3.9 per cent per annum over this period, suggesting that the productivity decline in the cluster may be cyclical in nature and does not reflect underlying trends. Similarly, the Information & Communications sector's trend productivity growth was 2.3 per cent per annum, higher than the actual productivity growth of -0.5 per cent.

[3] Other methods such as the Christiano-Fitzgerald random walk filter and the Butterworth square-wave high pass filter may be used for the same purpose as well. We elect to use the HP filter due to its simplicity, widespread use and general acceptance.

Exhibit 4: Productivity Trend Growth by Sector, 2010-2013



There are reasons for greater optimism moving forward

There are several reasons for us to believe that productivity will improve moving forward. First, as the manpower tightening measures were introduced in phases to give firms time to adjust, the full effect of these measures are only beginning to be felt. For instance, foreign employment growth has already slowed from 5.7 per cent in 2010 to 4.2 per cent in 2013. Excluding construction and foreign domestic workers, foreign employment growth slowed even more, from 8.6 per cent to 2.3 per cent over the same period.

Second, there are encouraging signs that companies' attitudes towards productivity have shifted. To date, more than 17,000 companies have benefitted from the various productivity initiatives under the NPCEC, with 7,000 companies in 2013 alone.

Third, we are seeing progress in low productivity sectors. In Construction, over 6,000 companies have tapped on the various schemes under BCA's $250m Construction Productivity and Capability Fund, with about $190m committed. Site productivity, measured as total floor area constructed per man day, has also been improving at an increased rate. Growth in site productivity increased from 0.2 per cent in 2010 to 1.5 per cent in 2013. SPRING's roadmaps for the Retail and Food Services sectors have also benefitted about 1,200 companies, with about 39,000 workers trained.

With time, as global economic conditions continue to pick up and our productivity initiatives take effect, we are confident that we will see an uplift to our productivity growth.

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